Bridge Span Activity

Introduction

If you were to hear words like Golden Gate, Brooklyn, and London what would come to mind? It's likely you thought of bridges. A bridge is a structure built to span obstacles and make the transportation of people or cargo a much easier task. Spanning the Mississippi River has long been an important need for transportation. The first bridge to span the Mississippi, the historic Hennepin Avenue Bridge, was built in Minneapolis and opened in 1855.

Many types of bridges are used around the globe and across the Mississippi River. Some of the most common types are arch, suspension, cable-stayed, and truss. These bridges have unique characteristics, with some spanning many miles. The type of bridge built is usually determined by its purpose, materials available, and the load that will be placed on it.

In the Twin Cities area you will find at least forty bridges of several types crossing the Mississippi or Minnesota Rivers. Types include arch, suspension, truss, and steel girder, among others. Appearance of the bridge is important for historic and scenic areas. Well known Twin Cities bridges include the Hennepin Avenue Suspension Bridge, Stone Arch Bridge, 35W Freeway Bridge, Lake Street Bridge, Mendota Bridge, High Bridge (in St. Paul), and Wabasha Bridge, among others.

The design of a bridge must be carefully considered. Safety, reliability, and cost are three of many determining factors. Bridges serve a wide variety of purposes, carrying not only cars and trucks, but also trains, bikes and pedestrians. Without bridges, traveling from one place to another would be quite difficult.

Equipment

- Computers with internet access
- 8 ½ X 11 sheets of paper
- Scotch tape
- Tennis balls

Estimated Time

90 minutes

Procedure

Working in teams of two, use the internet for 20-30 minutes to investigate the different types of bridges used today. (Hint: search for "bridge crossings of the Mississippi River" to find local bridges.)

Your team will then design and build a bridge that will hold a specified weight in the middle for a determined time frame using only the materials provided. The objective is to build the longest spanning bridge while still supporting the specified weight. You have 45 minutes to complete your bridge (teacher may modify to 60 minutes).

Materials List

You will be provided with the following building materials.

- 8 sheets of 8 ½ X 11 paper
- 18" of Scotch tape

Constraints

- The bridge cannot be taped to the support embankments.
- The bridge must be able to be transported to the testing station in the classroom.
- The tennis ball being used as the weight must be at the tallest part of the bridge when testing for span support and length.
- The tennis ball must be supported for one minute.
- Each team will have three chances to test the bridge per round.

The winner of this challenge will be the team who builds the bridge with the longest span capable of holding the tennis ball for the allotted time.

Conclusion

1. What would you have done differently if you could start building your bridge again?

2. What was challenging about this project?

3. If you could have had more materials from the list above, what would make your bridge span longer?

4. What design factors produce a strong bridge?